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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/828,564	04/06/2001	Yogendra Joshi	361007-000012	6497

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EXAMINER

PATEL, NIHIR B

ART UNIT

PAPER NUMBER

3743

DATE MAILED: 01/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/828,564

Applicant(s)

JOSHI ET AL.

Examiner

Nihir Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 4-6, 13, 15, 16 and 33-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7-12, 14, 17-32 and 36-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 4 through 6, 13, 15, 16, and 33-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 7.

Response to Arguments

2. Applicant's arguments filed on September 23, 2002 have been fully considered and are persuasive. The examiner agrees that claim 1 is generic with respect to claims 1-42 and claim 39 with rest to claims 40-42.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1, 2, 3, 7, 12, 17, 43, and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Ghoshal US Patent No. 6,474,074. Referring to claim 1, Ghoshal discloses an apparatus for dense chip packaging using heat pipes and thermoelectric coolers that comprises a central evaporator 210 (see figure 2 and column 2 lines 60-65) in contact with the heat-dissipating component (see figure 2 and column 4 lines 5-10);

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a condenser 225 (see figure 2 and column 2 lines 60-65) in fluid communication with and extending around the periphery of the evaporator (see figure 2, column 2 lines 60-67, and column 3 lines 1-5);

a liquid coolant partially filling the condenser and at least partially filling the evaporator (see column 3 lines 13-25); and

means for cooling the condenser (see figure 3 and column 5 lines 25-30).

Referring to claim 2, Ghoshal discloses cooling means that comprises cooling fins (see figure 3).

Referring to claim 3, Ghosal discloses cooling fins that extend from the condenser (see figure 3).

Referring to claim 7, Ghosal discloses a boiling enhancement structure 250 (see figure 2 and column 4 lines 5-15) disposed within the evaporator (see figure 2 and column 4 lines 5-15).

Referring to claim 12 (see figure 2), Brownell discloses a first plate 230 having an interior major surface and exterior major surface;

a second plate 240 (see figure 2), generally parallel to, spaced from, and similar in planar dimension to the first plate 230, having an interior major surface and an exterior major surface, the interior major surface opposing the interior major surface of the first plate 230, with a central parallel plane passing through the space therebetween, the second plate exterior major surface in contact with at least a portion of the component (see figure 2) and extending outside the limits of that portion of the component; wherein the interior major surfaces define an evaporator volume (see figure 2).

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Referring to claim 17, Ghoshal discloses a central plane that is horizontal and the first plate 230 (see figure 2) is above the second plate 240 (see figure 2), the liquid coolant fills the evaporator.

Referring to claim 43, Ghoshal discloses an apparatus for dense chip packaging using heat pipes and thermoelectric coolers that comprises a central evaporator 210 (see figure 2); a condenser 225 (see figure 2) in fluid communication with and extending around the periphery of the evaporator; a liquid coolant (see figure 2) partially filling the condenser and at least partially filling the evaporator; and means for cooling the condenser (see figure 3); and placing the evaporator in contact with the heat-dissipating element (see figures 2 and 3).

Referring to claim 44, Ghoshal discloses a void (see figures 2 and 3) in the evaporator to allow the coolant to directly contact the heat-dissipating element.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-11, 18-22, 25, 32, 39, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over combined teachings of Ghoshal US Patent No. 6,474,074 and Anderson et al. US Patent No. 5,761,037.

Referring to claim 8, Ghoshal discloses the applicant's invention as claimed with the exception of providing boiling enhancement structure that comprises a plate having a first major

surface and a second major surface, both surfaces having parallel grooves cut in them, the grooves in first surface being perpendicular to the grooves in the second surface.

Anderson discloses an orientation independent evaporator that does provide a boiling enhancement structure that comprises a plate having a first major surface and a second major surface, both surfaces having parallel grooves cut in them, the grooves in first surface being perpendicular to the grooves in the second surface (see figure 3A). Therefore it would be obvious to modify Ghoshal's invention by providing boiling enhancement structure that comprises a plate having a first major surface and a second major surface, both surfaces having parallel grooves cut in them, the grooves in first surface being perpendicular to the grooves in the second surface in order to obtain better heat transfer.

Referring to claim 9, Ghoshal discloses the applicant's invention as claimed with the exception of providing grooves in each surface that are cut to a depth that is at least one half of the thickness of the boiling enhancement structure plate.

Anderson discloses an orientation independent evaporator that does provide a boiling enhancement structure that does provide grooves in each surface that are cut to a depth that is at least one half of the thickness of the boiling enhancement structure plate (see figure 3A). Therefore it would be obvious to modify Ghoshal's invention by providing grooves in each surface that are cut to a depth that is at least one half of the thickness of the boiling enhancement structure plate in order to obtain better heat transfer.

Referring to claim 10, Ghoshal discloses the applicant's invention as claimed with the exception of stating that the boiling enhancement structure material is selected from the group consisting of copper, diamond, and silicon.

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Anderson discloses an orientation independent evaporator that does state that the boiling enhancement structure material is selected from the group consisting of copper, diamond, and silicon (see column 3 lines 55-65 and column 4 lines 1-10). Therefore it would be obvious to modify Ghoshal's invention by stating that the boiling enhancement structure material is selected from the group consisting of copper, diamond, and silicon in order to obtain better heat transfer.

Referring to claim 11, Ghoshal discloses the applicant's invention with the exception of stating that the boiling enhancement structure comprises open-celled porous foam.

Anderson discloses an orientation independent evaporator that does state that the boiling enhancement structure comprises open-celled porous foam (see column 3 lines 55-65 and column 4 lines 1-10). Therefore it would be obvious to modify Ghoshal's invention by stating that the boiling enhancement structure comprises open-celled porous foam in order to obtain better heat transfer.

Referring to claims 18, 19, 20, 21, 22, 25, 32, 39, 40, 41, and 42, Ghoshal discloses the applicant's invention as claimed with the exception of stating that through the ranges of angular orientation from the central plane is horizontal and the first plate is above the second plate, to when the central plane is vertical, the evaporator is substantially full of liquid coolant.

Anderson discloses an orientation independent evaporator that does state that through the ranges of angular orientation from the central plane is horizontal and the first plate is above the second plate, to when the central plane is vertical, the evaporator is substantially full of liquid coolant (see column 4 lines 1-5 and lines 30-40). Therefore it would be obvious to modify Ghoshal's invention by stating that through the ranges of angular orientation from the central plane is horizontal and the first plate is above the second plate, to when the central plane is

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vertical, the evaporator is substantially full of liquid coolant in order to obtain better heat transfer.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over combined teachings of Ghoshal US Patent No. 6,474,074 and Paal US Patent No. 5,051,814.

Ghoshal discloses the applicant's invention as claimed with the exception providing a second plate that is formed with at least a portion of the heat-dissipating component from a single piece of material.

Paal discloses a method of providing stress-free thermally-conducting attachment of two bodies that does provide a second plate that is formed with at least a portion of the heat-dissipating component from a single piece of material (see figure 1). Therefore it would be obvious to modify Ghoshal's invention by providing a second plate that is formed with at least a portion of the heat-dissipating component from a single piece of material in order to obtain better heat transfer.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over combined teachings of Ghoshal US Patent No. 6,474,074 and Brzezinski US Patent No. 5,323,292.

Ghoshal discloses the applicant's invention as claimed with the exception of providing a first wall extending from each evaporator plate, the first wall having an interior surface, a proximate edge and a distal edge, the proximate edge sealingly joined to the periphery of the respective plate, and the first wall extending perpendicularly from the entire periphery of each plate in a direction away from the central plane for a substantially constant distance, whereby the distal edge is substantially parallel to the plates; a second wall extending from each respective first wall, each second wall having an interior surface, a proximate edge and a distal edge, the

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proximate edge of each second wall sealingly joined to and extending perpendicularly from the entire distal edge of the adjoining first wall in a direction away from the evaporator volume; and a third wall having an interior surface, a proximate edge and a distal edge, the proximate edge of each third wall sealingly joined to and extending perpendicularly from the entire distal edge of the adjoining second wall such that the distal edges of the respective third walls abut and sealingly join at the central plane, whereby the interior surface of the first, second, and the third walls define a condenser volume in fluid communication with the evaporator volume.

Brzezinski discloses an integrated multi-chip module having a conformal chip/heat exchanger interface that does provide a first wall extending from each evaporator plate, the first wall having an interior surface, a proximate edge and a distal edge, the proximate edge sealingly joined to the periphery of the respective plate, and the first wall extending perpendicularly from the entire periphery of each plate in a direction away from the central plane for a substantially constant distance, whereby the distal edge is substantially parallel to the plates; a second wall extending from each respective first wall, each second wall having an interior surface, a proximate edge and a distal edge, the proximate edge of each second wall sealingly joined to and extending perpendicularly from the entire distal edge of the adjoining first wall in a direction away from the evaporator volume; and a third wall having an interior surface, a proximate edge and a distal edge, the proximate edge of each third wall sealingly joined to and extending perpendicularly from the entire distal edge of the adjoining second wall such that the distal edges of the respective third walls abut and sealingly join at the central plane, whereby the interior surface of the first, second, and the third walls define a condenser volume in fluid

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communication with the evaporator volume. Therefore it would be obvious to modify Ghoshal's invention with this feature in order to obtain better heat transfer.

Referring to claim 24, the applicant claims that each plate and its respective walls are formed from a unitary piece of material, it has been held "that the use of a one piece construction instead of the structure disclosed in [the prior art] would be merely a matter of obvious engineering choice." In re Larson, 340 F.2d 965, 144 USPQ 347, 349 (CCPA 1965).

Referring to claims 26, 29, and 36, the applicant claims that the planer shapes of the evaporator and the condenser peripheries are substantially rectangular (claim 28) or square (claim 29).

The shape of the evaporator and condensers is simply a matter of design choice as stated in the applicant's specifications page 9 lines 1-10. The applicant states "the feature may be any shape as desired to suit a particular application or manufacturing advantage".

Claims 27, 28, 30, 31, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over combined teachings of Ghoshal US Patent No. 6,474,074 and Munekawa et al. US Patent No. 5,076,351. Ghoshal discloses the applicant's invention as claimed with the exception of providing a condenser with a height (HB) that is greater than the height (HE) of the evaporator.

Munekawa discloses a heat pipe that does provide a condenser with a height (HB) that is greater than the height (HE) of the evaporator. Therefore it would be obvious to modify Ghoshal's invention by providing a condenser with a height (HB) that is greater than the height (HE) of the evaporator in order to obtain better heat transfer. Regarding the equation, it would have been obvious to one having ordinary skill in the art at the time the invention was made to

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have the condenser with a greater height than the evaporator, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.


In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Nihir Patel whose telephone number is (703) 306-3463. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful the examiner supervisor Henry Bennett can be reached at (703) 308-0101.

NP
January 23, 2003


Henry Bennett
Supervisory Patent Examiner
Group 3700